IS 8422-2 (1977): Piston Rings for IC Engines, Part II: Taper Faced Compression Rings from 30 up to 200 mm Nominal Diameter M-rings [TED 2: Automotive Primemovers]

BLANK PAGE

UDC 621·43-242·3 (First Reprint AUGUST 1986) IS : 8422 (Part II) - 1977

(Reaffirmed 2000)

Indian Standard

SPECIFICATION FOR PISTON RINGS FOR IC ENGINES

PART II TAPER FACED COMPRESSION RINGS FROM 30 UP TO 200 mm NOMINAL DIAMETER

M-RINGS

Internal Combustion Engines Sectional Committee EDC 14; Piston Assembly Component Subcommittee, EDC 14 : 1 [Ref: Doc: EDC 14 (2634)]

1. Scope — Specifies dimensions, tolerances, tangential loads and other details of M-rings (taper faced compression rings) from 30 up to 200 mm nominal diameter for internal combustion engines.

2. Dimensions and Tolerances — Shall be as given in the Table 1 read along with Fig. 1

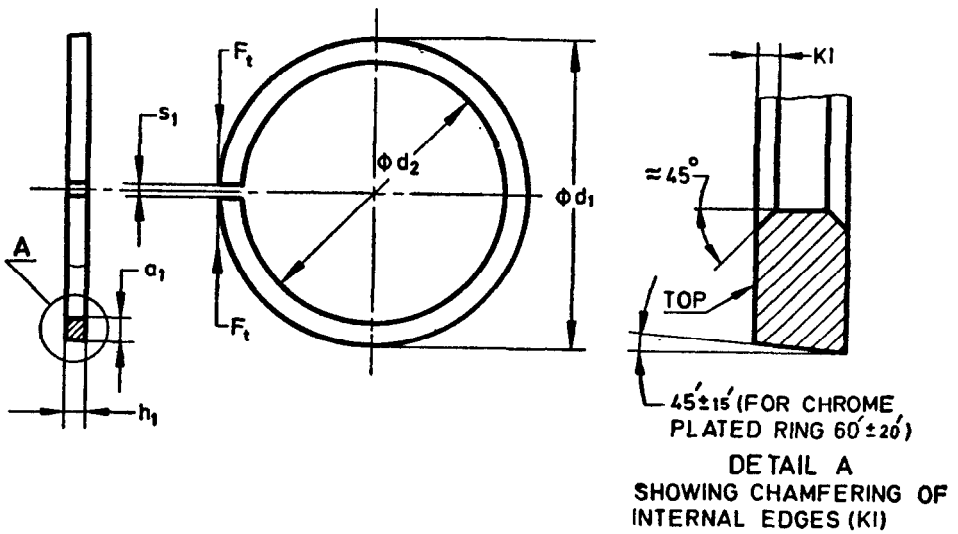

FIG. 1 TAPER FACED COMPRESSION RING (M-RING)

3. Designation — Shall include:

a) Type of ring,

b) Nominal diameter d_1,

c) Axial width h_1,

d) Number of this standard,

e) Material symbol,

f) Manufacturing process,

g) Whether inside edges chamfered KI, and

h) Type of coating.

Example:

A taper faced compression ring (M-ring) having a nominal diameter d_1=90 mm, axial width h_1=2·5 mm, made of alloyed cast iron (A4), with inside edges chamfered (KI) and phosphate coated (P) shall be designated as:

M-Ring 90×2·5 IS: 8422 (Part II) A4 KI P

Adopted 14 April 1977 Gr 4

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

TABLE 1 DIMENSIONS AND TANGENTIAL LOADS FOR M-RINGS

(*Clause* 2, and *Fig.* 1)

(All dimensions in millimetres)

Nominal Diameter d_1	Inside Diameter d_2	Radial Wall Thickness a_1	Tol	Axial Width of Ring h_1 $^{-0.010}_{-0.022}$ 1	2	3	Closed Gap s_1	Chamfering of Inside Edges Kl	Tangential Force F_t*, in N±20%, for h_1 Shown in column 1	2	3
30	27·5	1·25	+0·10 −0·15 with a maximum variation of 0·10 in a ring	1·5	2	2·5	$0.15^{+0.20}_{0}$	0·2±0·1	3·9	5·2	6·5
32	29·3	1·35							4·4	5·8	7·3
34	31·1	1·45							4·8	6·4	8·0
35	32·1	1·45							4·5	6·0	7·5
36	33	1·5							4·7	6·3	7·8
38	34·8	1·6							5·1	6·8	8·6
(38·455)	35·255	1·6							—	6·8	—
40	36·6	1·7							5·6	7·4	9·3
42	38·5	1·75							5·5	7·3	9·2
44	40·3	1·85							5·9	7·9	9·9
45	41·2	1·9							6·1	8·2	10·2
46	42·1	1·95							6·3	8·5	10·6
48	44	2							6·3	8·4	10·5
50	45·8	2·1	+0·10 −0·20 with a maximum variation of 0·15 in a ring				$0.20^{+0.20}_{0}$		6·7	8·9	11·2
52	47·6	2·2							7·1	9·5	11·9
53	48·5	2·25							7·3	9·8	12·2
54	49·4	2·3							7·6	10·1	12·6
55	50·4	2·3							7·3	9·7	12·1
(55·07)	50·47	2·3							—	9·66	—
56	51·3	2·35							7·5	10·0	12·5
(57·0)	52·1	2·45							—	9·5	—
58	53·1	2·45							7·9	10·6	13·2
60	54·9	2·55					$0.25^{+0.20}_{0}$		8·3	11·1	13·9
(60·33)	55·93	2·55							—	10·88	—
(61·5)	56·3	2·6							—	10·7	—
62	56·8	2·6							8·3	11·0	13·8
63	57·7	2·65							8·5	11·3	14·1
64	58·6	2·7							8·7	11·6	14·5

65 66 (66·68) 67	59·5 60·4 61·08 61·4	2·75 2·8 2·8 2·8							8·9 9·1 — 8·8	11·9 12·2 11·8 11·8	14·9 15·2 — 14·7
68 (69·88) 70 (70·04) 72 (73·02) 74	62·3 63·98 64·1 64·14 65·9 66·82 67·8	2·85 2·95 2·95 2·95 3·05 3·1 3·1	+0·10 −0·20 with a maximum variation of 0·15 in a ring				$0{\cdot}25^{+0{\cdot}20}_{0}$	$0{\cdot}2\pm0{\cdot}1$	9·1 — 9·5 — 9·9 — 9·8	12·1 11·6 12·6 12·58 13·2 12·66 13·1	15·1 — 15·8 — 16·5 — 16·4
75 76 (77·0) 78	68·7 69·6 70·4 71·4	3·15 3·2 3·3 3·3		1·5	2	2·5			10·1 10·3 — 10·7	13·4 13·7 13·2 14·3	16·8 17·1 — 17·8
(79·38) 80 82 (82·55) 84	72·68 73·3 75·1 75·65 76·9	3·95 3·35 3·45 3·45 3·55	+0·10 −0·25 with a maximum variation of 0·18 in a ring				$0{\cdot}30^{+0{\cdot}20}_{0}$	$0{\cdot}3\pm0{\cdot}15$	— 10·6 11·1 — 11·5	13·56 14·2 14·7 14·3 15·3	— 17·7 18·4 — 19·1
85 86 (87·31) 88 (88·9) (88·92)	77·8 78·88 79·91 80·6 81·5 81·52	3·6 3·6 3·7 3·7 3·7 3·7							11·7 11·4 — 11·8 — —	15·6 15·2 14·55 15·8 15·3 15·3	19·5 19·0 — 19·7 — —

Note 1 — Dimensions within the parenthesis are not valid for new designs.

Note 2 — For intermediate sizes and oversizes for reboring, the dimensions and characteristics (other than d_2) of the next smaller nominal diameter apply.

Note 3 — Tangential force F_t values in columns 1, 2 and 3 correspond to the values of axial width h_1 shown in columns 1, 2 and 3.

*Tangential load values are specified for material A_1 only [*see* IS : 5791-1977 Technical supply conditions for piston rings for internal combustion engines (*first revision*)]. For other materials, load factors given in IS : 5791-1977 shall be used.

(*Continued*)

TABLE 1 DIMENSIONS AND TANGENTIAL LOADS FOR M-RINGS — *Contd*

(All dimensions in millimetres)

Nominal Diameter d_1	Inside Diameter d_2	Radial Wall Thickness s_1	Tol	Axial Width of Ring h_1 $^{-0.010}_{-0.022}$ 1	2	3	Closed Gap s_1	Chamfering of Inside Edges KI	Tangential Force F_t*, in N±20%, for h_1 Shown in Column 1	2	3
90	82·4	3·8							16·4	20·4	24·5
92	84·2	3·9							16·9	21·2	25·4
(92·08)	84·28	3·9							—	21·14	—
94	86·1	3·95							16·8	21	25·2
95	87	4							17·1	21·4	25·7
(95·25)	87·25	4							—	21·22	—
96	87·9	4·05							17·4	21·8	26·1
98	89·7	4·15							18	22·5	27
(98·42)	90·12	4·15							—	22·2	—
(98·43)	90·13	4·5							—	22·19	—
100·00	91·6	4·2	+0·10 −0·25 with a maximum variation of 0·18 in a ring	2	2·5	3	0·40 $^{+0.25}_{0}$	0·3±0·15	17·9	22·3	26·8
(100·61)	92·21	4·2							—	21·88	—
(101·69)	93·09	4·3							—	21·82	—
102	93·4	4·3							18·4	23·0	27·6
(103·17)	94·57	4·3							—	22·19	—
(103·35)	94·75	4·3							—	22·07	—
104	95·4	4·3							17·6	22·0	26·4
105	96·1	4·45							19·2	24·0	28·8
106	97	4·5							19·5	24·3	29·2
(107·95)	98·95	4·5							—	23·26	—
108	99	4·5							18·7	23·3	28·0
110	100·8	4·6							23·9	28·7	33·5
(111·18)	101·78	4·7							—	27·8	—
112	102·6	4·7		2·5	3	3·5			24·6	29·5	34·4
114	104·6	4·7							23·6	28·4	33·1
(114·3)	104·9	4·7							—	28·07	—

115	105·4	4·8	+0·10 −0·25 with a maximum variation of 0·18 in a ring	2·5	3	3·5	$0{\cdot}40^{+0{\cdot}25}_{0}$	0·3±0·15	24·7	29·6	34·6
116	106·4	4·8							24·2	29·1	33·9
118	108·2	4·9							24·9	29·8	34·8
120	110	5							25·5	30·6	35·6
122	112	5							24·5	29·5	34·4
124	114	5							23·6	28·4	33·1
125	114·6	5·2							26·2	31·4	36·7
126	115·6	5·2							25·8	30·9	36·1
128	117·6	5·2							24·8	29·8	34·8
130	119·2	5·4							26·9	32·3	37·7
(130·17)	119·37	5·4							—	32·17	—
132	121·2	5·4							26	31·3	36·5
134	123·2	5·4							25·2	30·2	35·2
135	124	5·5					$0{\cdot}50^{+0{\cdot}25}_{0}$		26·1	31·4	36·6
136	125	5·5							25·7	30·9	36
138	127	5·5							24·9	29·9	34·8
140	128·6	5·7							32·2	37·6	43
142	130·6	5·7							31·2	36·5	41·7
(142·87)	131·47	5·7							—	35·8	—
144	132·6	5·7						0·4±0·15	30·2	35·3	40·3
145	133·2	5·9							33·1	38·6	44·1
146	134·2	5·9							32·6	38·1	43·5
148	136·2	5·9							31·6	36·9	42·1
150	138	6		3	3·5	4			32·2	37·6	43
152	140	6							31·3	36·5	41·7
154	142	6							30·3	35·4	40·5
155	142·6	6·2					$0{\cdot}60^{+0{\cdot}25}_{0}$		33·1	38·6	44·1
156	143·6	6·2							32·6	38·1	43·5
158	145·6	6·2							31·7	36·9	42·2
160	147·2	6·4							33·9	39·5	45·2
162	149·2	6·4							33	38·4	43·9
164	151·2	6·4							32	37·4	42·7

Note 1 — Dimensions within the parenthesis are not valid for new designs.

Note 2 — For intermediate sizes and oversizes for reboring, the dimensions and characteristics (other than d_3) of the next smaller nominal diameter apply.

Note 3 — Tangential force Ft values in columns 1, 2 and 3 correspond to the values of axial width h_1 shown in columns 1, 2 and 3.

*Tangential load values are specified for material A_1 only [*see* IS : 5791-1977 Technical supply conditions for piston rings for internal combustion engines (*first revision*)]. For other materials, load factors given in IS: 5791-1977 shall be used.

(*Continued*)

TABLE 1 DIMENSIONS AND TANGENTIAL LOADS FOR M-RINGS — *Contd*

(All dimensions in millimetres)

Nominal Diameter d_1	Inside Diameter d_2	Radial Wall Thickness		Axial Width of Ring h_1 $^{-0.010}_{-0.022}$			Closed Gap s_1	Chamfering of Inside Edges KI	Tangential Force F_t*, in N±20%, for h_1 Shown in Column		
		a_1	Tol	1	2	3			1	2	3
165	152	6·5							33·1	38·6	44·1
166	153	6·5	+0·10 −0.25 with a maximum variation of 0.18 in a ring	3	3·5	4	$0{\cdot}60^{+0{\cdot}25}_{0}$	0·4±0·15	32·7	38·1	43·5
168	155	6·5							31·7	37	42·3
170	156·6	6·7							33·9	39·5	45·2
172	158·6	6·7							33	38·5	44
174	160·6	6·7							32·1	37·5	42·8
175	161·2	6·9							40·4	46·2	—
176	162·2	6·9							40	45·7	—
178	164·2	6·9							38·9	44·5	—
180	165·8	7·1							41·3	47·2	—
182	167·8	7·1							40·3	46·1	—
184	169·8	7·1							39·3	44·9	—
185	170·6	7·2	+0·15 −0·30 with a maximum variation of 0·23 in a ring	3·5	4·0	—	$0{\cdot}70^{+0{\cdot}25}_{0}$	0·6±0·2	40·4	46·2	—
186	171·6	7·2							40	45·7	—
188	173·6	7·2							39	44·5	—
190	175·2	7·4							41·3	47·2	
192	177·2	7·4							40·3	46·1	—
194	179·2	7·4							39·4	45	
195	180	7·5							40·5	46·2	
196	181	7·5							40	45·7	
198	183	7·5							39·1	44·6	—
200	184·6	7·7							41·3	47·2	

Note 1 — Dimensions within the parenthesis are not valid for new designs.

Note 2 — For intermediate sizes and oversizes for reboring, the dimensions and characteristics (other than d_2) of the next smaller nominal diameter apply.

Note 3 — Tangential force F_t values in columns 1, 2 and 3 correspond to the values of axial width h_1 shown in columns 1, 2 and 3.

*Tangential load values are specified for material A_1 only [*see* IS : 5791-1977 Technical supply conditions for piston rings for internal combustion engines (*first revision*)]. For other materials, load factors given in IS : 5791-1977 shall be used.

4. General Requirements — Shall be as given in IS: 5791-1977.

5. Marking — The rings which are to be fitted in a particular direction shall be marked with the word 'TOP' on the top sides of the rings. For other markings reference should be made to IS: 5791-1977.

5.1 *ISI Certification Marking* — Details available with the Indian Standards Institution.

EXPLANATORY NOTE

This standard is one of the series of Indian Standards on piston ring dimensions, tangential force, etc. IS: 5791-1977 is a necessary adjunct to this standard which gives details of materials, surface finish, gap types and sizes, surface coatings, manufacturing processes, etc.

In the preparation of this standard due consideration has been given to the prevalent sizes in the industry. It is recommended that for new designs, only the sizes given in this standard be used. The sizes given within parenthesis are non-preferred and should be avoided.

In the preparation of this standard assistance has been derived from DIN 70911 'Piston rings for automotive engineering, M-rings, taper faced compression rings from 30 up to 200 mm nominal diameter', issued by Deutscher Institut für Normung (DIN).